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United States School Garden Army

The spring manual of the U.S. School Garden Army

Washington

1919

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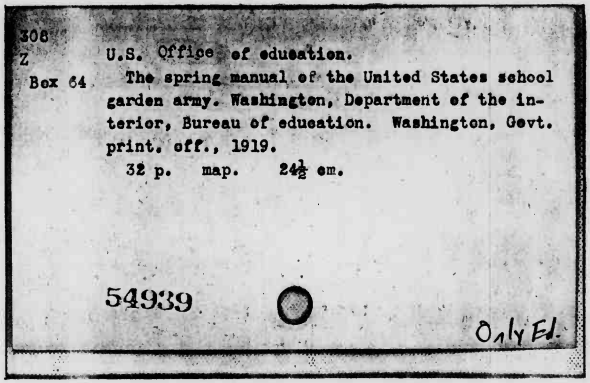
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THE SPRING MANUAL

OF THE

UNITED STATES SCHOOL GARDEN ARMY

WASHINGTON
DEPARTMENT OF THE INTERIOR
BUREAU OF EDUCATION

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

UNITED STATES SCHOOL GARDEN ARMY

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A Garden for Every Child.
Every Child in a Garden.

THE SPRING MANUAL OF THE UNITED STATES SCHOOL GARDEN ARMY

A LETTER FROM MR. HOOVER

UNITED STATES FOOD ADMINISTRATION,
Washington, December 23, 1918.

To the Members of the United States School Garden Army:

The work that you have done during the past months of war has been no small contribution to the great cause of humanity. The actual food produced in your gardens was of material help by making possible a saving of staple foods available for export to our men abroad and the allies, thus giving them just that much more of the food so vital to them. The growing of supplies for local use was also a definite assistance in relieving the strain upon our railroads. The example set by you in your undertaking has stimulated and inspired others to produce where they had not produced before. It would be a matter of regret if this work should not go on. America's food obligation to the stricken countries is great and affords no less opportunity to help than during the past season.

(Signed) HERBERT HOOVER.

THE WORLD NEED

Against the background of the chaos of present world conditions one appalling fact stands out in bold relief—in this nineteen hundred and nineteenth year of the Christian era millions of men, women, and children are doomed to death by famine. Surrounded by the seeming plenty of our food supplies few of us realize the awful conditions of the helpless people in other lands. Yet it is certainly true that the need for saving and producing food is now greater than at any time during the war.

America has pledged her honor to send abroad two-thirds more food than she sent in 1918—an aggregate for this year of 20,000,000 tons. The carrying out of this pledge depends upon the loyal help of every citizen and the pledge itself lays a special duty upon the young soldiers of the United States School Garden Army. We still have many troops across the seas to whom food must go in plenty, and millions of hungry children are looking to us for the food to keep them alive. The real test of the School Garden Army is at hand. Are we a lot of shallow enthusiasts to lay down our hoes when the drums cease to beat, or are we an Army of food-producing workers, loyally responding to the need of the world?

Soon after the armistice was signed Premier Lloyd George announced that one of the great tasks ahead for Great Britain and America is to organize the world against starvation. In this program—so vital to the future of democracy—the schools of America have a great part to play. Fortunately all educators now understand that such real experiences as children get in gardening are essential to any education worthy the name, and that the teaching and supervision of this subject is a proper part of any real school system, coming definitely under the control of the school authorities and not to be sublet to any outside agency.

This Spring Manual of the School Garden Army is intended to supplement both the Fall Manual sent out during the early weeks of the school year and the regional leaflets issued at frequent intervals. Copies of the Fall Manual and of the leaflets for any given region will be furnished free on application.

Many reasons exist for making 1919 the greatest garden year in history. The schools owe it to themselves as well as to the starving peoples of the world to see that during this year there is a garden for every child and that every child in a garden has adequate instruction and supervision.

MAKING UP THE SEED LIST

The vegetable garden, so far as possible, should supply the needs of the family. The practicability of doing this depends of course on many things, but chiefly on the size of the garden and the number in the family. In a general way it is possible to estimate the needs in advance and to make up the seed list accordingly.

Here is a little table that shows how many servings for a family of four may be expected from certain vegetable rows 24 feet long:

Summer of 127 days.

	Rows.	Servings.		Rows.	Servings.
Peas	7	14	Eggplant	1	25
Beets	2	10	Okra	2	15
Corn	8	40	Beans	1	50
Turnip	1	5	Lima beans	3	15
Carrots	2	10	Peppers	1	25
Kohlrabi	1	4			

Winter of 238 days.

	Rows.	Servings.		Rows.	Servings.
Beets	2	10	Cabbage	9	9
Parsnip	3	15	Rutabagas	1	18
Salsify	4	20	Onions	4	40
Carrots	2	10			

[1] Heads.

And here is another table that shows the amount of seed needed to supply a family of four with vegetables throughout the year:

Bean:			Onion sets	quarts	4–6
Bush lima	pint	1	Pea, garden	quarts	4–6
Pole lima	do	1	Parsley	packet	1
Snap	quarts	1–2	Parsnip	ounce	½
Beet	ounces	4	Radish	do	1
Cabbage:			Spinach:		
Early	packet	1	In spring	pound	¼
Late	ounce	½	In fall	pound	½
Carrot	do	1	Squash:		
Celery	packet	1	Hubbard	ounce	1
Corn, sweet	pints	1–2	Summer	do	1
Cucumber	ounce	1	Tomato:		
Eggplant	packet	1	Early	packet	1
Kale	ounces	2	Late	ounce	¼
Lettuce	do	½	Turnip	do	2–3

It is not supposed that any family will use all the vegetables listed, nor will all families require the same amount of any crop. The pupil should select his seed from this list and make successive plantings.

THE SEED ORDER

All seeds of a given kind may look alike yet the crops they produce may vary greatly—some good, some fair, some poor. For a seed is simply a baby plant wrapped in an outer covering. What it will grow into depends largely upon its parentage.

The best seeds have had their ancestors carefully selected by the men who grew them. The fields in which they were being produced have been gone over frequently and all unpromising plants removed. This has left for seed production only those true to the type desired.

Such selection costs money. So the selected types are likely to be a little higher in price than those unselected, but they are well worth the difference. The reputable seedsmen make it a rule to handle only selected seeds.

The first result of selection is the production of varieties. It is much better for you to buy a packet of French breakfast radish seed than simply a packet of radish seed. You are likely to get a better crop and will learn more about gardening in growing the crop.

So in planning for the seed order, the first thing is to plan to buy good seed and the second is to plan to buy named varieties.

Seeds may be bought in bulk much cheaper than in packets. The making of small envelopes or seed packets is an excellent school exercise. So is the dividing of the seeds in bulk into small sets. The working out of the cost of the smaller portions when a pound is so divided up furnishes a good problem in arithmetic.

The following suggestions are made as to the buying of seeds:

1. Where practicable buy in bulk of reliable seed houses, and subdivide the seeds with the help of the pupils.

2. Buy named varieties, selecting either those recommended on the lists sent out from this office or those which have been found successful by local gardeners. An excellent way to get the pupils interested is to ask them to find out the names of successful varieties grown locally by home or professional gardeners. Make the basis of the list the varieties which the pupils have grown themselves.

3. When the seeds are bought in prepared packets, get named varieties, if possible.

4. The supply of seeds this year is very short. There must be no waste. So calculate carefully and order only what are needed.

GETTING YOUR GARDEN READY

The success of your garden depends largely upon the condition of the soil in which you sow the seeds. Soil that has not been spaded or plowed for some time becomes so hard that the roots of plants can not easily go through it. So you must get the ground ready by digging it up and working it over so that the bits of soil will be loosened from one another. This makes it easy for roots and root hairs to penetrate between them and get from them the moisture and plant food needed for rapid growth.

The process of digging up and working over the soil is called *tillage*. Plowing and spading are examples of *deep tillage*. Cultivating, hoeing, or raking are examples of *surface tillage*.

In small gardens deep tillage is best done with a spade or tined digging fork. The spade or fork should be thrust down in a nearly vertical direction to its full depth and the soil turned over. After this is done it is well to spread broadcast over the freshly turned soil a light dressing of commercial fertilizer. Then rake the surface smooth. The soil is now ready to be lined out and planted.

In tilling clay soils it is important to wait until the ground is so dry that it crumbles easily between the fingers. Here are two simple tests which any pupil can make:

1. Take about a heaping teaspoonful of the damp clay soil. Work it into the shape of a marble. Roll the marble along the ground. If it does not crumble, the soil is too wet to work.

2. Take about a heaping teaspoonful of soil. Squeeze it tightly in the hand so that the water runs out between the fingers. Now, drop the ball upon hard ground. If it simply flattens out, the soil is too wet to be tilled. If it crumbles, it is in the right condition to till.

Sandy soil can be greatly improved by spading in fallen leaves, stable fertilizer, lawn rakings, or almost any kind of vegetation. As this material gradually decays it furnishes the right conditions for holding moisture and supplying food to plant roots. Such decaying vegetation in the soil is called *humus*.

Many garden soils are infested with witch-grass roots. These should be dug out before the crops are planted. A tined potato digger is one of the best tools for this purpose. A hoe or a spade that cuts the roots is worse than useless. Each piece will grow into a new plant.

COMMERCIAL FERTILIZERS

Compost, manure from the stable, hen house, or pigeon loft, are the best fertilizers for the garden. When these are not available in sufficient quantities then we find it necessary to secure commercial fertilizers. It is also often advisable to use commercial fertilizers as a supplement to manure.

The better commercial fertilizers contain plant food in a readily available form, and will, therefore, help materially in producing a good garden crop. The three elements most common are nitrogen, phosphorus, and potassium. The nitrogen can be supplied in the nitrate of soda and sulphate of ammonia, which are the most common chemical sources of this plant-food element. The most common nitrogenous fertilizers from organic sources are dried blood, tankage, fish scraps, and cottonseed meal. The phosphorous needed for soils is supplied through chemical sources from phosphate rock, and Thomas slag; through organic sources by ground raw bone, ground steamed bone, and bone black. The organic sources of potash fertilizer come from unleached and leached wood ashes and tobacco stems. The chemical sources of potash come from kainit, muriate of potash, and sulphate of potash. Because of the war the prices on the chemical sources of potash are too high to be profitable. It is advisable, therefore, to use ashes for this food. Wood ashes also contain about 30 per cent lime and hence serve a double purpose of furnishing the lime and a small per cent of potash.

For a garden containing 1,000 to 1,250 square feet, 10 pounds of nitrate of soda and 30 pounds of acid phosphate will make a good application. The nitrate of soda is applied by placing half of a quantity in the row at planting time and the other half scattered broadcast and raked into the soil. A ton of stable manure could be used on a garden 1,000 or 1,250 square feet in size. Results on a garden of the above size would be better, however, if to this amount of stable fertilizer 50 pounds of acid phosphate could be added and well raked in just as soon as the ground is plowed.

Most seed houses now sell ready prepared garden fertilizers. These can be purchased in small quantities. A good garden fertilizer will contain 3 to 5 per cent nitrogen and 8 to 10 per cent phosphoric acid. The dealer will explain the best mixtures for the different types of soil. Most gardeners count on using about 5 pounds of commercial fertilizer for each 100 square feet of garden space.

A little study of the best methods of using commercial fertilizers on any garden will yield the gardener a splendid reward for his time spent.

WHEN TO PLANT YOUR CROPS

You can easily arrange the different vegetable crops in two groups—those which are hardy to frost and those which are tender to frost. The time of planting of any crop depends largely upon whether it belongs to the first or the second of these groups.

For this reason you can plant the seeds of lettuce, onions, parsnips, or turnips as soon in spring as the ground is in good condition to work, even though frosts may occur after the seedlings come up. But it would be foolish for you to plant at that time the seeds of tender vegetables like sweet corn, beans, cucumbers or squash.

It is highly desirable that every garden supervisor and teacher in the Eastern States should have a copy of the planting zone map issued by the Department of Agriculture, Washington, D. C. This map, entitled "Planting Zones for Vegetables in the Eastern Half of the United States," is based on the average dates of the last killing frost in spring. The map is issued as a separate document and also as a part of Farmer's Bulletins 934 and 937 and may be obtained by writing the Department of Agriculture.

In general it has been found practicable to classify vegetables into four groups with relation to the time of planting. These are indicated as follows:

GROUP 1.—Consisting of early cabbage plants from hot bed or seed box, radishes, onions, early smooth peas, early potatoes, turnips, and mustard. These crops may be planted two weeks before the last killing frost.

GROUP 2.—Consisting of beets, parsnips, carrots, lettuce, salsify, spinach, wrinkled peas, cauliflower plants, celery seed, parsley, and sweet corn. These crops may be planted about the date of the last killing frost.

GROUP 3.—Consisting of snap beans, okra, and tomato plants. These crops should be planted two weeks after danger of frost is over.

GROUP 4.—Consisting of lima beans, pepper plants, eggplant, cucumbers, melons, squash, and sweet potatoes. These crops can not be planted until all danger of frost is over, which is about four weeks after the last killing frost.

Find out the usual date of the last killing frost in your town.

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HOW TO PLANT YOUR CROPS

Well begun is half done in gardening as in other things. To get good crops, you must begin by sowing the seeds at the right time and in the right way.

One of the easiest mistakes you can make is to sow the seeds too deep. When this happens, you are likely to wonder why the plants do not come up. But if you dig down you will find the buried seedlings trying hard to reach the surface.

The smaller the seed is the smaller is the baby plant that comes from it. So in general you should cover small seeds with only a little soil and large seeds with more soil.

A good deal depends, however, upon the kind of soil and the condition it is in. In early spring when the soil is wet, the seed does not need to be covered so deeply as in summer when the soil is dry.

It is also especially necessary in summer to firm the soil down upon the seeds, by walking over it or by pressing a board down upon the rows after the seeds are planted. This serves to bring the soil particles in closer contact with the seeds so that they absorb moisture better. It also enables the root hairs that soon appear upon the sprouting roots to get moisture for growth more easily and it helps the rise of soil moisture from below by capillary attraction.

The depth of seeding also depends somewhat upon the character of the soil. A sandy loam through which the little seedlings can easily poke their heads is of a very different consistency from a clay soil which often bakes into a hard crust that effectually smothers the plants, which are unable to break through. Consequently, one can cover the seeds deeper in sandy soils than in those of clay.

The thickness of seeding depends upon various conditions. In a great many cases one must sow many more seeds than can possibly mature. One reason for this is that a lot of seedlings growing close together can break through the ground more easily than they could by pushing up singly. Consequently, this ability to work together in coming up is one important reason for thick seedage. Another is that by thus having a surplus of seedlings one can use a process of selection when it comes to thinning the plants, leaving in each case the strongest ones to grow.

MAKING AND USING AN OUTDOOR SEED BED

An outdoor seed bed is a great help in growing several vegetables. It need be only a few feet square. It should be chosen in a sunny sheltered spot where the soil is rich and well drained. Then the soil should be made fine and mellow. The little seedlings have tiny roots and with still more tiny root hairs. The finer and richer the soil, the surer and more rapid is the growth.

Clay soils may be improved by working in lime or sandy loam. Sandy soils may be improved by working in finely rotted manure or leaf mold from the woods. In any case it is well to spread over the surface a light dressing of commercial fertilizer and rake it in. Make the surface layer fine and smooth.

Having the seed bed thus prepared the next thing is to pack it down rather lightly with a flat board. But be careful simply to firm the soil and not to pack it so tightly as to drive the air from between the bits of soil. When this is done the drills may be furrowed out with a pointed stick or anything that is handy.

The next thing is to sow the seeds. Scatter these along the bottom of the furrow, dropping them from between the thumb and fingers. For some of the smaller seeds this is a good plan: Cut off the corner of the seed packet. Hold the packet in the left hand. Tap it gently with a lead pencil as you carry it along over the furrow. This causes the seeds to come out evenly along the row. The depth of covering depends upon the size of the seeds.

After the seeds are covered, the soil should be thoroughly firmed down with a piece of board in order that the roots of the young plants may take a firm hold. Great care is needed in watering so as not to wash out the seeds. It is a good plan to cover the soil with old burlap and pour the water on the burlap.

When the plants come up the soil between the rows should be hoed with care. Where the seedlings are too thick they should be thinned. They are likely to grow rapidly and should be ready to transplant in a few weeks.

Several vegetables may be started to advantage in the outdoor seed bed. Among these are cabbage, parsely, lettuce, Brussels sprouts, and tomatoes. In the case of the latter, early varieties should be selected for this planting outdoors.

This outdoor seed bed can often be made at the school and used as a distribution garden for the home gardens of the pupils.

WEEDING YOUR GARDEN

A weed is a plant out of place. A carrot growing in a row of onions is a weed. It is out of place. It belongs in a row of carrots. A poppy growing in a row of carrots is a weed. It belongs in a bed of poppies. But most weeds are neither good to eat like the carrot nor beautiful to look upon like the poppy. They are vagrant plants—the tramps of the garden—ready at any time to steal food and moisture, air and sunlight from the useful crops to which the garden belongs.

In most gardens there are vast numbers of weed seeds of many kinds ready to sprout into life whenever there is a chance. So when we plant the garden to radishes or carrots or lettuce or other crops and wait for these seedlings to appear, the eager weed seeds make the most of the opportunity and come up by the thousands. Many of these young weeds are sturdy plants, ready to grow so rapidly that they will crowd out the seedlings we wish to raise. Consequently, we must pull up the tramps, roots and all, and cast them on the ground to wither and die.

This process of pulling or otherwise destroying the weeds in the row of seedlings is called *weeding*. It is one of the most important garden operations, especially in the spring when so many crops are getting started.

To pull weeds intelligently we should know them by sight, and be able to distinguish them from the young seedlings of the crop plants. So if one does not know just how the crop seedlings look, be sure to find out before the weeding begins.

Weed seeds are easily distributed. Wind and insects help this distribution. In general, weed seeds are very hard to kill. Changes of temperature have little effect upon them. They sprout readily in small amounts of soil and will thrive well even under disadvantageous conditions.

To assist in destroying the weeds various small tools called hand-weeders are used. They enable one to stir the soil nearer the crop seedlings than can usually be done by the hand. In case the seedlings are to be thinned to several inches apart, these weeders can be used to dig out seedlings and weeds together.

Make a blackboard list of the weeds the pupils know by sight.

THINNING YOUR VEGETABLES

When we plant garden seeds, we generally sow them thicker than we wish the plants to grow. All seeds do not sprout and therefore we sow many of them to get the desired number of plants. Then, when the seeds do sprout and grow, the mature plants will require more room for development than the seedlings. In order to give the best plants room enough, we remove the others. This removal of plants is called *thinning*.

In the case of most crops it is important to make the first thinning early enough to avoid disturbing the roots of the plants left in the soil. At first each seedling has only a few short roots, but as it grows these roots become longer and reach out in all directions. If two seedlings are close together, the roots will mingle with each other so that one plant can not be pulled up without breaking off many of the roots of the other. Such a breaking off of roots is liable to injure the plant left and to check its growth.

This early thinning is particularly important in the case of cucumbers and other vine crops. These plants are especially sensitive to the disturbance of their roots, and if two are left close together until they are of good size, it is difficult to pull up one without serious injury to the other.

The final aim of thinning is to give to each plant plenty of room in the soil for adequate root development and plenty of room above ground for its leaves, flowers, and fruits to mature successfully. There is a constant struggle among all plants for food, moisture, light, and air. The more crowded they are the fiercer is this struggle.

The aim of the gardener is to give to each plant the most favorable conditions for growth. So he allots to each the space it needs to make the most of itself. If it is naturally a large plant, he leaves the seedlings far apart, and if a small one he leaves the seedlings nearer together, thinning as may seem necessary for the best growth of each.

HOW TO TRANSPLANT

When you dig up a plant from a box, a hotbed, or a row in the garden and set it out in a new place you *transplant* it. If you are to be a really good gardener, you will need to know how to transplant several of your crops in such a way that they will grow.

You drop a seed into the open drill. You cover it with soil. The rain waters it. The sun warms it. The seed sprouts into a seedling that sends out roots below the surface and a shoot above the surface. When the seedling has been growing for a few days it becomes connected with soil particles by hundreds of tiny rootlets and thousands of root hairs.

If you dig up your seedlings most of these rootlets and nearly all of the root hairs will be broken off. This is, of course, a shock to the plant. It stops growing because food materials that have been coming through the root hairs and rootlets are no longer sent up. A new lot of these must be developed for growth to continue.

One of the best ways to prevent this injury is to grow the seedlings in a flower pot or something similar in which the roots will develop in a compact space. Then the seedling can be carefully taken out, or if the receptacle is of paper the whole may be set directly in the soil. The paper will soon rot away.

The great trouble in transplanting is that the seedling wilts. This is because the water evaporates from the leaves and no water comes in through the roots to replace that which evaporates. It helps to have lots of water in the plant when it is dug up. So the soil in which the seedlings are growing should be soaked a few hours before they are dug up.

The hotter the sunshine the more rapidly does evaporation take place. So it is desirable to transplant on a cloudy, moist day, or else in the late afternoon.

The greater the leaf surface the larger the amount of water evaporated. So it is often desirable to remove the larger leaves, or cut them through the middle. This is a great help in letting the plant get hold in its new position.

It is, of course, necessary that there should be plenty of moisture in the soil about the roots. So to be sure of this we may pour water before transplanting into the hole where the plant is to go or we may pour water on the surface after it is set out. On a larger scale we will be sure the soil is freshly tilled.

It is important that the soil particles be directly in contact with the roots. This will enable the rootlets and root hairs to get moisture more easily. So in setting out the seedlings we should press the soil down firmly with the hands.

SPINACH A GOOD CROP FOR GREENS

Spinach is one of the best greens crops that can be grown in the garden. Every garden should raise some of this very desirable plant. Spinach is generally used as a spring and fall crop. It is a cool weather crop and quickly goes to seed when the weather gets too warm.

Several varieties of spinach are listed in the seed catalogues. Norfolk Savoy, Victoria, and Long Standing are three of the best of these.

PLANTING

The best crops are grown in the cooler climates of the North and the middle and northern sections of the South. It can be grown all during the winter months in the southern sections of the South. The winter crops are generally protected with straw or leaves in the coldest sections. Seeds may be planted early in February, March, or April or in September and October. One ounce of seed is enough for 100 feet of row. Sow the seeds in drills from 12 to 15 inches apart. The soil in which spinach is grown should be deep, rich, warm, and well-drained. Nitrogen fertilizer should be applied to the soil as a top dressing in the early spring. Successive sowings should be made.

GROWING

Spinach will not grow well in hot, dry weather. Every effort should be made to conserve soil moisture. If practicable, the spinach bed should be artificially watered during droughts. The plant is ready to harvest as soon as the tender green rosette of leaves has formed. The entire plant is removed from the bed. To harvest the plant, cut the root about a half inch below the top of the soil. Take the larger plants before the smaller ones: this allows the latter more time to mature.

Beans or corn make good companion crops to spinach. For the spring-grown spinach, beets or onions make good follow crops.

LETTUCE AND HOW TO GROW IT

Lettuce thrives best in cooler weather. During the winter months, in the northern section of the South, it may be grown in hotbeds. In some sections in the Gulf States it may be grown in the open all through the winter.

The more important types of lettuce are the Leaf Lettuce and the Head Lettuce. Grand Rapids and Black-seeded Simpson are good varieties of leaf lettuce. Big Boston, May King, Hanson, Gates Giant, and California Butter Cream are good varieties of head lettuce.

PLANTING

To make lettuce leaves crisp and tender the plants should be forced. Successive plantings should be made every 10 days in spring. When grown in the garden, seeds are sown in rows about 14 inches apart, and the plants thinned out. The heading plants should be at least 8 inches apart in the rows. If the loose-leaf lettuce is grown, the plants may be located much closer together. For very early plants, seeds are sown in a hotbed and plants transferred later to the garden. One-fourth ounce of seed is enough for every 25 feet of row space. Have soil well prepared and apply a good quality of stable manure, working it thoroughly into the soil. Lettuce planted in the fall may be left in ground all winter in many sections of the South.

If seed is planted in hotbeds, plants should be transferred to cold frames about February or March and to the garden in April. Place the young plants about 8 inches apart in rows 1 foot apart.

GROWING

Keep the lettuce bed well hoed. In transplanting plants be careful not to get soil in the head. Lettuce should be grown in well-drained, rich soil. If plants are left in ground all winter, they may be protected with leaves or boards during excessive cold. Lettuce matures in about 60 days.

Lettuce heads up better when the seedlings are transplanted.

SWISS CHARD FOR SUMMER USE

Swiss chard furnishes two distinct vegetables for table use. The young plants and the green leaf blades of the older plants are excellent to boil as potherbs and use as greens. The thick leaf stalks make a very palatable vegetable when boiled and served as asparagus or celery is served, usually with a white sauce.

This chard is really a leaf beet and thrives best in a rich soil which is not sour. If the soil is sour, it should be thoroughly limed before planting the seed. The best variety is Giant Lucullus Swiss chard.

PLANTING

Select soil which is rich and not sour. Prepare thoroughly by deep tillage as soon as it is well dried out. Apply broadcast a liberal dressing of commercial fertilizer. Rake the surface smooth. Line the rows 14 inches apart. Sow also a few seeds of a small early radish to mark the rows. Cover about three-quarters of an inch deep. Firm the soil over the seeds.

GROWING

Hoe or rake the soil surface between the rows as soon as the seedlings come up. Pull the radishes as fast as they are large enough to eat. Thin the young chard seedlings, which are likely to come up in little bunches because there are commonly several seeds in the seedlike fruits you sowed, until there is only one seedling in a place, an inch or more apart. Thin again two weeks later so that the plants are at least 6 inches apart. Transplant some of the seedlings if needed to fill gaps or to make a larger planting. Weed at times of thinning and whenever necessary. Till the soil surface between the rows at least once a week until the ground is shaded by the leaves. Apply a light dressing of nitrate of soda or a good commercial fertilizer if the soil is poor or the growth of the leaves is slow. Cut the outer leaves as fast as they become large enough to use, but not so closely that the plants have not enough leafage to continue thrifty growth.

PARSNIPS FOR WINTER USE

The parsnip is easily grown in a deep, rich, mellow soil if planted early in the spring. It is one of the few crops that may be left outdoors over winter and harvested as soon as the frost is out of the ground in spring.

Care should be taken that the parsnip seed used is perfectly fresh. Obtain seed only from reputable dealers. The parsnip seed quickly loses its germinative power and only the best should be planted if good results are to be obtained. The class should germinate a few samples of the seeds to be planted in order to test the viability.

There are three distinct types of parsnip roots—the long, the half-long, and the short or round. For many years the standard variety was the Long Hollow Crown, which is still very largely grown. The Guernsey, or Student, is the only important variety of the half-long type. The Early Round, or Short Round French, is about the only well-known variety of the short type.

CULTURE

Select, if possible, a rich, deep, loamy soil. Prepare it thoroughly to a depth of 15 inches as early in the spring as the ground can be worked. Apply a good dressing of commercial fertilizer and rake it in. Line the rows 15 inches apart. Make the drills an inch deep. Sow the seed 6 to the inch. Sow also a few radish seeds about one every 2 inches. Hoe as soon as the radishes mark the rows, and once a week thereafter until the parsnip leaves shade the ground. Weed the rows early. Pull the radishes as fast as they get large enough to eat. Thin the parsnip seedlings early to 4 or 5 inches apart; if left for later thinning the long tap roots are hard to pull out.

HARVESTING AND STORING

The best way to get the long parsnips out of the ground is to dig a trench along the sides of them as far down as the small tips of the roots. Then take hold of the tops and pull toward the open trench. Dig the roots which are needed for use in fall and winter in October. Wash carefully and store in moist sand in the vegetable cellar. About the time the ground freezes cover the others with mulch of straw, lawn clippings or fallen leaves held in place by boards or brush. Let them remain in this way until the frost is out of the ground in spring.

KOHLRABI, A CROP YOU SHOULD SURELY GROW

It is always interesting to grow a crop new to your garden. It gives you a broader knowledge and increases the amount of food you can grow. Kohlrabi is one of the best crops for you to try.

Kohlrabi is so little grown in home gardens that most people think it is hard to raise. But it may be grown as easily as the turnip, and you know that anyone can grow turnips. A few weeks after the Kohlrabi plants come up, the stems just above the ground swell out to a diameter of 2 or 3 inches, making an edible ball that is delicious when picked early and properly cooked. After standing too long the ball becomes woody and worthless.

Kohlrabi is one of several edible members of the cabbage group. Like its relatives it is hardy to frost and thrives best in cool weather. While it is sometimes started under glass in the same way as early cabbage the crop is usually grown outdoors from the first.

CULTURE

Buy a packet or an ounce of seed of Earliest Erfurt or Early White Vienna Kohlrabi. Prepare rich mellow soil thoroughly as soon in spring as it is in condition to work. Apply a dressing of commercial fertilizer and work it in. Line the rows 15 inches apart. Make the drills an inch deep. Sow the seeds sparsely three or four to the inch. Weed as needed. Hoe early and often, but do not get the soil into the swollen part of the stem. Thin to 4 inches apart. Pull the plants and cut off the swollen parts of the stem as they reach a diameter of 2 inches.

SUCCESSION

Plant two or three crops in the spring at intervals of two weeks. In August sow seed for a fall crop. Store any surplus stems of this fall crop in sand in the vegetable cellar.

In some parts of the United States the late crops of Kohlrabi are likely to be attacked by aphids or plant lice. Keep a close watch for these and spray promptly with tobacco insecticides.

BEETS FOR BOTH SUMMER AND WINTER

Beets thrive best in a rich, sweet, mellow, well-drained soil. It is not worth while to try to grow them in a sour soil. Such a soil must be sweetened by liberal applications of agricultural lime, thoroughly worked in. Beet "seeds" are really little pods, each having several seeds, so thinning is necessary, no matter how far apart the "seeds" are sown. This vegetable is used when small for greens and the roots are cooked at all stages from the time they are large enough to pull.

Good varieties are: Crosby's Egyptian, Early Eclipse, Detroit Dark Red, Crimson Globe.

PLANTING

Prepare the soil thoroughly. Apply broadcast a good dressing of commercial fertilizer and rake it in. Line the rows 12 inches apart. Make the drills an inch deep. Soak the seeds in warm water for 8 to 10 hours. Sow the seeds sparsely about half an inch apart. Sow also in the same drills a few seeds of an early radish. Cover about an inch deep.

GROWING

Hoe or rake the soil surface between the rows as soon as the rows are plainly to be seen through the coming up of either radishes or beets. Pull the radishes as fast as they are large enough to eat. Weed early and carefully. Thin the beets twice, first to an inch apart and second to 2 or 3 inches apart. Use for beet greens the plants thus pulled up. Hoe or rake the soil surface every five days until the leaves shade the ground. Pull as needed, choosing each time the largest beets and leaving the smaller ones.

SUCCESSION

The main crop of beets for fall and winter use should be planted several weeks after the early crop. In middle and northern regions June is a good month for sowing the main crop, and Detroit Dark Red is a good variety for the purpose.

RUTABAGAS FOR WINTER STORAGE

The rutabaga is one of those vegetables that must be eaten to be appreciated. Just because you have seen it fed to cattle is no reason you should think it not good enough for you to eat. It is indeed one of the most delicious of the root crops and it has a high food value.

The rutabaga is one of the best keepers of all the vegetables. So it is a good crop to raise for any gardener who has the laudible ambition to make his plot of ground produce as large a part of the family food supply as possible.

The rutabaga requires a longer season of growth than does the turnip. It thrives best in a rich, loamy soil and a cool climate.

Some varieties of rutabagas are white inside and others are yellow. Budlong's Improved, Large White French, and Purple Top are good white varieties, while Golden Heart is a good yellow sort.

PLANTING

Select a rich, moist, well-drained, loamy soil. Wait until the ground is dry enough to work easily and then prepare it thoroughly by plowing, harrowing, and raking, or by spading and raking. Apply broadcast a good dressing of commercial fertilizer and rake it in. Line the rows 15 inches apart. Make the drills an inch deep. Sow the seeds sparingly; they are so small that they must be sown by the fingers with great care or mixed with fine sand before sowing. Cover three-quarters of an inch deep and firm the soil lightly.

GROWING THE CROP

Hoe the ground between the rows as soon as the seedlings appear and at least once a week afterwards until the leaves shade the surface. Thin early and repeatedly, not letting the seedlings interfere with one another and leaving them finally to stand 4 to 6 inches apart. Weed carefully at times of thinning. Pull the larger roots in summer as needed for use, but leave the main crop to grow until freezing weather. Harvest in October by digging or pulling. Cut off the tops well above the crown. Store in bins or boxes of sand or sifted coal ashes in a cool cellar.

CARROTS FOR EVERY GARDEN

Carrots are among the most healthful and delicious of all root crops. They are easy to grow. They may readily be stored for winter use. There are three main types of carrot roots: The Short or Round, the Half-Long, and the Long. Earliest Short-horn or French Forcing is a good variety of the first. Chantenay and Danvers Half-long are good varieties of the second. The half-long sorts are desirable for the main crop.

PLANTING

Wait until the ground is well dried out so that it can be easily worked. Prepare thoroughly by plowing and harrowing or spading and raking. Apply broadcast a dressing of commercial fertilizer. Rake the surface smooth. Line the rows 12 inches apart. Make the drills an inch deep. Sow the seeds sparsely in a continuous row, being very careful not to sow too many of these very small seeds. Sow also in the same drills a few seeds of early radish like Early Scarlet Globe to mark the rows. Cover one-half inch deep.

GROWING

Hoe or rake the soil surface between the rows as soon as they are plainly to be seen through the coming up of either radishes or carrots or both. Pull the radishes as fast as they are large enough to eat. Weed early and carefully. Thin the seedlings twice, first when they have two or three true leaves in addition to the slender seed leaves, to about an inch apart, and second, two weeks later, to an inch apart. Hoe or rake at least once a week until the tops shade the ground.

SUCCESSION

Early in spring sow French Forcing or Early Scarlet Horn for early summer use. At the same time or a month or two later, sow Coreless. Chantenay or Danvers are for late summer and winter use.

Look up varieties of carrots in the seed catalogs.

PLANTING TURNIPS EARLY AND LATE

The turnip is a good crop for rich moist soils. It is not so likely to thrive on poor sandy soils or on new clay soils. It is a cool-season crop and should be grown both in spring and fall.

To be good to eat, turnips should grow right along from the time the plants come up. If they grow slowly or stop growing they get stringy or woody and are not good to eat.

Some turnips are white, others yellow. The white kinds have the mildest flavor. These are good white varieties: Early Snowball, Early Purple-top Milan, Early White Egg. Golden Ball is a good yellow turnip.

PLANTING

Select a rich, cool, mellow soil, preferably with no manure added this season. Wait only until it is dry enough to work easily. Prepare thoroughly, raking the surface to get it in fine condition. Apply broadcast a dressing of commercial fertilizer. Line the rows 12 inches apart. Make the drills one-half inch deep. Mix the small seeds with fine sand and sow sparsely. Cover one-half inch deep and firm the soil lightly.

GROWING

Hoe the soil surface between the rows as soon as the seedlings appear, and at least once a week afterwards until the leaves shade the ground. Thin early, pulling out a large proportion of the seedlings before they begin to crowd. Repeat the thinning two or three times at intervals of a week or two, until the plants left are 3 or 4 inches apart. Weed carefully at times of thinning. Pull as needed for use, removing each time the largest roots and thus making more room for the smaller ones to grow.

Let the pupils look up turnips in the seed catalogues. Let each learn at home the different ways turnips are cooked. Let them draw outline pictures of turnips for the booklet on vegetables.

Don't overplant the early crop of turnips. Two sowings of a 15-foot row is likely to furnish a family supply for early summer. The fall and winter crop is to be sown in June, July, or August, depending on the latitude.

HOW TO GROW CABBAGES

The cabbage is one of the most useful garden vegetables. It is served in a great variety of ways and is an important element in the family food supply. It requires a rich, mellow soil, with constant surface tillage and should be kept growing steadily from start to finish. If growth is checked the heads are liable to burst open later. The plants grow best in cool weather, so the crop should be planted early from seedlings started under glass that the heads may mature before midsummer, or late, so that the chief growth will take place after midsummer. A new part of the garden should be chosen for cabbage each year, as diseases are likely to develop without such rotation.

Along the Gulf coast region of the Southern States cabbage may be sown in the open garden from late September to early January. In other sections hotbeds or cold frames are used for starting early cabbage plants. Seeds should be planted in frames about eight weeks before time of transplanting to the garden. Cabbage will withstand a hard freeze if the plants have been carefully hardened before transferring to the garden. Cabbages are not grown during the summer in the South, as they can not withstand the heat.

Here is a little list of good varieties of cabbage: Early—Jersey Wakefield and Charleston Large Wakefield. Medium—Copenhagen and Succession. Late—Danish Ballhead and Autumn King. It is important to get carefully selected strains of cabbage seed.

GROWING THE CROP

The plants should be transplanted as soon as the soil can be worked in good condition. They should be placed about 12 to 18 inches apart in the row and one-half to 1 inch deep. The rows should be from 30 to 36 inches apart for convenient cultivation with the wheel hoe. Seed for the fall crop should be planted in June. Transplant the plants as soon as they are about 4 inches in height and the soil contains sufficient moisture to insure their proper growth.

Cabbages are sometimes injured by club-root, a disease caused by a slime mold which causes the roots to grow abnormally. This disease is not likely to injure the plants in a soil that has been sweetened with plenty of lime or wood ashes.

Cabbages are ready for use as soon as the heads are well formed. The interior of the cabbage plant should be white. It takes about 150 days for the cabbage plant to mature. In the South early cabbages may be followed by potatoes, okra, or corn.

GROWING YOUR OWN POTATOES

The Irish potato is a native of America but was called Irish potato after its introduction into Ireland. It is grown successfully in nearly all parts of the United States and many countries of the Old World. It grows best on a well-drained sandy loam, rich in humus.

In any garden which is large enough to grow a lot of vegetables some potatoes may well be planted. If there is not room to grow enough for the family supply, some early potatoes may be planted to bridge over the time when the new crop comes in at a high price.

Beginners often plant too many potato eyes in a hill. From each eye a stalk is likely to come. The more stalks in each hill the smaller will be the potatoes, because the plants crowd one another. Two or three good plants will produce more potatoes of the right size than a dozen will.

So cut the seed potatoes into pieces that have two or three eyes each, but leave a good deal of white part on each piece. They should weigh at least 2 ounces each in order to give the shoots a good start.

VARIETIES

These are good varieties of early potatoes: Early Ohio, Early Bovee, Irish Cobbler. And these are good for the main crop: Green Mountain, Carman No. 3, Gold Coin, Sir Walter Raleigh.

PLANTING

Prepare the soil thoroughly, choosing where possible a piece of ground that has had much manure worked into it in previous seasons. Line the rows 2 feet apart. Dig the furrows about 5 inches deep. Work into the bottom of the furrows a light dressing of commercial fertilizer, mixing it well with the soil. Drop the cut tubers 12 or 14 inches apart. Cover 4 inches deep.

GROWING

Hoe or rake the soil surface two or three times after the plants come up. In northern regions, where danger of injury by long periods of drought is not great, hill the rows at the third hoeing. For early sorts hill the rows anyway. Spray with Bordeaux mixture and arsenate of lead two or three times, beginning when the plants are about 8 inches high. Dig the early crop as soon as the potatoes are large enough to eat. At first, instead of pulling up the whole plant and thus checking its further production, reach in beside the hill and pull out the large tubers.

SWEET CORN TO EAT AND TO CAN

Sweet corn can be grown to advantage in those home gardens that have room for the cultivation of the larger vegetables. Corn can be canned or dried if desired and kept for winter use.

The Indians used to plant corn at the time in spring when the oak leaves are as large as squirrels' ears. This is a good rule to-day. It is about the time of the last killing frost. Later plantings should be made for succession.

In growing sweet corn it is important to have a good-sized patch. One or two rows alone are likely not to do well, because the yellow powder, called pollen, that comes from the tassels is blown away. To get good ears, some of this pollen must fall upon the silk of the young corn ears. So it is a good plan to have the corn in a square block rather than in long rows.

When two gardens are near together it will help to have the corn plots in the two gardens next to each other. You thus double the chances for the pollen to do its work.

A good succession of varieties is Golden Bantam, Country Gentleman, and Stowell's Evergreen. A pint of seed is sufficient for 200 feet of rows.

PLANTING

As soon in spring as the ground has warmed up and danger from frosts has about passed, prepare it thoroughly. Apply commercial fertilizer broadcast and rake it in. Line the rows 30 inches apart for dwarf varieties; 3 feet apart for tall kinds.

For drills, make the furrows 2 inches deep and sow a kernel of corn every 4 inches. Cover 2 inches deep.

For hills, hoe out a space every 2 feet and scatter six kernels in each hill, having each kernel at least an inch away from the others. Cover 2 inches deep.

GROWING

Hoe and weed the corn plants as soon as they are up and continue hoeing the surface at least once a week. A month after the corn comes up thin the plants—if in drills to 10 or 12 inches apart; if in hills to three plants to a hill. Leave always the most vigorous plants to grow. It is sometimes advised to pull off the suckers at the base of the corn plants, but careful experiments have shown that it is better to leave them to grow.

CUCUMBERS FOR SALADS AND PICKLES

Cucumbers are easily injured by the cold. They grow best in a rich mellow soil. If an early crop is desired, the plants should be started in a hotbed and transferred later to the garden. Two or three weeks may be saved by using this method.

These are good varieties of cucumbers: White Spine, Davis Perfect, and Emerald.

PLANTING

Cucumbers are usually planted in hills. When all danger of frost is past, prepare the soil thoroughly and open the hills a foot deep and 2 feet across. Fill each hole two-thirds full of barnyard manure and mix in a spade full of soil. Cover this with about 3 inches of soil. Drop 8 or 10 seeds on the hill and cover with an inch of fine soil. If the cucumbers are planted in rows, open the furrows about 5 feet apart. Scatter manure along the furrow and mix with the soil. Plant the seed about 2 inches deep. Thin young plants to 12 or 18 inches apart in row. It is advisable for early cucumbers to plant seed in berry baskets or paper pots in a sheltered place. Later, after danger of frost is over, move and place in the ground baskets, pots, and all. These will soon rot and the roots will develop rapidly.

GROWING

When danger from bugs is past thin to three or four plants to hill. Cucumbers should have frequent cultivation until the vines are well grown. Protect the plants from the cucumber beetle by spraying with arsenate of lead, or by covering the hills with cheesecloth. Air-slacked lime sprinkled over the plants will help to keep off pests.

If cucumbers are planted in hills, the waste land between the hills may be used by sowing rows of bush beans. As fast as the beans mature gather them and remove the plants as soon as the crop is gathered.

MULCHES AND HOW TO USE THEM

Every living thing needs water. This is as true of plants as of animals. In many regions the greatest trouble in keeping the crops growing through the summer is to get water enough for the plants.

In winter the soil gets saturated with water. As the days become warmer and the sunshine hotter this soil water begins to go off into the air—to evaporate as people say—just as steam comes out of the teakettle when you put it on the fire.

If the soil is not plowed or spaded in spring the water evaporates rapidly and by early summer most of it is gone—leaving the dry soil behind. Every time the ground is stirred it holds the moisture better, and even a stirring of an inch or two of surface helps to save the soil water.

Did you ever lift up a board in summer and find that the ground was moist beneath it? The board had held the moisture so it could not escape into the air. You will find much the same condition under an old bag or piece of carpet lying on the ground, or even a pile of leaves or straw left upon the garden.

When the boards, or bags, or old carpets, or leaves, or straw are thus left upon the soil surface each acts as a mulch. For a mulch is anything placed upon the ground to stop evaporation of soil moisture.

A mulch of any kind prevents evaporation. Soil moisture is continually coming to the surface and evaporating into the air. The moisture passes up through the soil in the same way that oil climbs the wick of a lamp. This movement of soil moisture is called capillary attraction.

This movement can not take place unless the soil particles touch one another. So it happens that if you stir the soil for an inch or two at the surface you get much air between the particles of soil and make a *surface mulch*, without using straw or bags or anything but the soil itself.

A shower of rain will destroy this surface mulch, and so after each shower it is necessary to prepare another mulch. Even if no rain falls, there is generally sufficient dew to destroy the mulch after a few days. The maintenance of a mulch throughout the growing season is best for most garden crops.

SQUASH AND CUCUMBER BEETLES

Squashes, cucumbers, melons, and other vine crops are injured by many insects. The young plants are attacked by flea-beetles, striped cucumber beetles, and spotted cucumber beetles. These all bite the leaves or stems.

The injuries of these pests may be prevented in either of two ways: We may cover the hills with netting or cheesecloth or we may protect the plants with poison.

An easy way to shelter the hills is this: Cut a barrel hoop in halves. The hoop may be either of wood or wire. Put the cut ends of these halves into the soil of the hill in a way to make a cross arch, like the middle arch of a croquet ground. Put over the arch a piece of cheesecloth or mosquito netting large enough to protect the hill. Cover the edges of cloth with soil to hold it in place.

This protection is to be left in place until the growing leaves crowd against it. Then remove it and store the hoop pieces and the cloth in a dry place so that they may be used another season.

The following measures are also helpful against these pests:

1. Cover the hills as soon as the plants come up with a heavy mulch of tobacco powder. Add more around the stems every two weeks.
2. Dust the young plants thoroughly, when wet with dew, with arsenate of lead powder. Cover the stalks and both surfaces of the leaves.
3. Spray the young plants very thoroughly with arsenate of lead or with a combination of arsenate of lead and Bordeaux mixture.
4. Destroy both vine and green fruits as soon as the crop is gathered. If the beetles are able to feed upon green squashes left in the garden through the fall they are more likely to survive the winter to attack the crops next spring.

Remember always to keep arsenate of lead and other poisons out of the reach of young children.

HOW TO FIGHT POTATO PESTS

From the time potatoes are planted until they are harvested various enemies are likely to attack them. The potato beetles are the worst of these. The oval brownish black-striped beetles live over winter in the soil and come out in time to find the earliest potato plants as the leaves push through the ground.

The potato beetles feed upon these leaves, biting holes in them. They also lay clusters of yellow eggs upon the leaves. These eggs soon hatch into dark grubs that feed in colonies upon the foliage. The grubs grow rapidly and if not killed soon strip the plant of its green blades.

In a few weeks the grubs become full grown. Then they go into the soil and change into pupæ—the stage that is like the chrysalis of a butterfly. Here they remain 10 days or so and then come out as beetles again. So there are two broods of the beetles each season, and in some localities there may be more.

These beetles and grubs are leaf biters. So they may be killed by putting poison on the potato leaves. The best poison to use is arsenate of lead. Spray or dust this on the vines soon after they come up and repeat whenever the insects are seen in numbers.

OTHER POTATO INSECTS

Flea beetles are very small and lively. They hop about over the plant, eating small pits from the leaves. Spraying with arsenate of lead helps to kill them but a combination of Bordeaux mixture and arsenate of lead is better.

Later in the season the slender black or gray blister beetles attack potato vines in some regions. They may be controlled by hand picking or by spraying with arsenate of lead.

The potato stalk borer is the caterpillar or a moth that eats into the stem of the potato plant. All infested stalks should be pulled and burned. The insect also feeds on various weeds and these should be pulled and promptly burned early in autumn.

POTATO BLIGHTS

There are two blights that affect potatoes; one occurring early in the season and the other later. Bordeaux mixture should be used for each. In the early blight spraying should be done when the plants are about eight inches high. Repeat several times at intervals of two weeks. Spray for later blight about the end of July.

POTATO SCAB

This is a fungous disease. The spore of the fungus lives over the winter in the soil or on the tubers. To prevent it, soak seed potatoes in weak solution of formaldehyde. Use one-third pint of formaldehyde to 10 gallons of water.

SPRAYING WITH TOBACCO SOLUTIONS

Garden crops are attacked by two great groups of insects—those that bite the leaves and those that suck the sap.

The potato beetle is a biting insect. So you can kill it by putting arsenate of lead upon the leaves. The insect eats the poison with the leaf and is killed.

The green fly or aphis is a sucking insect. It inserts its sharp beak into the leaf and sucks out the sap. So it must be killed with something that destroys it by contact.

The nicotine poison in tobacco is one of the best of these contact-killing insecticides. It may be obtained by boiling tobacco stems in water or extracted by various other processes.

Many liquid nicotine preparations are upon the market. The best of these contain about 40 per cent of nicotine sulphate. It is to be very much diluted; generally 1 part of nicotine sulphate to 1,000 parts of water.

These liquid nicotine preparations may be used in this way unless different directions are printed on the package:

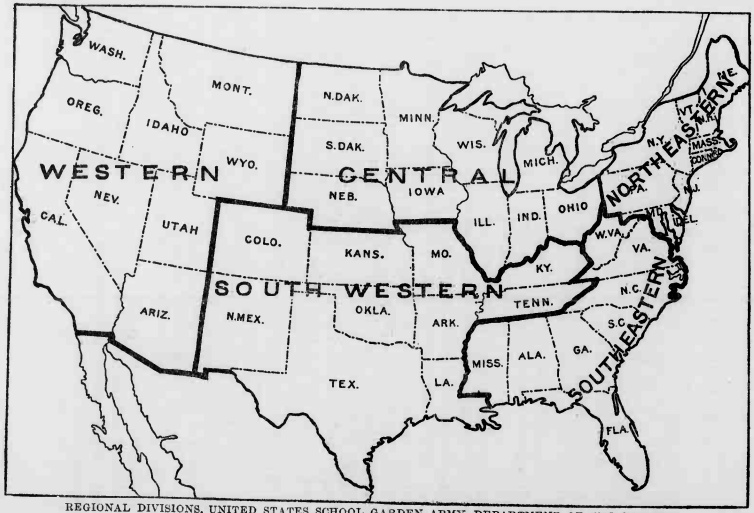
Spray promptly any plants on which plant-lice, thrips, leaf hoppers, or other sucking insects appear, either with a spray pump or hand sprayer. Dilute the nicotine preparations as follows:

One teaspoonful nicotine sulphate (40 per cent) to 1 gallon of water. Add to this one 1-inch cube of hard soap dissolved in a pint of hot water.

One fluid ounce nicotine sulphate (40 per cent) to 8 gallons of water. Add to this one-half pound hard soap dissolved in a quart or two of hot water.

One-half pint nicotine sulphate (40 per cent) to 50 gallons of water. Add to this 2 pounds soap dissolved in a gallon of hot water.

Always mix the liquid thoroughly, stirring it up just before spraying. Apply with a fine nozzle that will reach every tiny insect on the plant.



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